

CLAIMS

What is claimed is:

1. A process for scavenging hydrogen sulfide and/or mercaptans from a liquid or gaseous stream which comprises bringing the stream into contact with a scavenging effective amount of at least one scavenger selected from the group consisting of a:

- (i.) 1,3,5-trisalkanylamino hexahydro-1,3,5-triazine derivative;
(ii.) nitrogen heterocyclic compound of the formula:

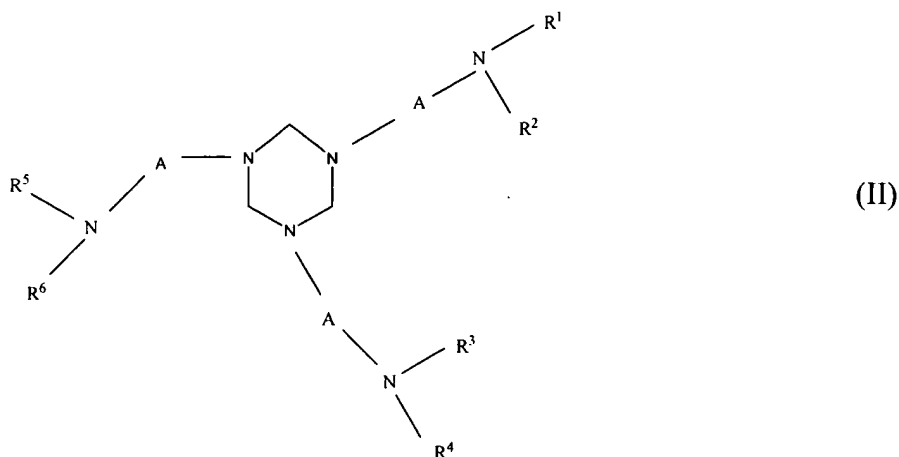


- 10 wherein Y is -N or -O and R^8 is an aminoalkyl group containing between 2 to 4 carbon atoms;

- (iii.) amine oxide;
(iv.) alkanolamine of the formula $(R_4)(R_5)N(R_6)OH$ wherein R_6 is a C_1 - C_{12} linear or branched alkyl group, R_4 and R_5 are independently selected from hydrogen, R_6 or R_7-OH , and R_7 is methylene or a C_2 - C_8 linear or branched alkylene group; or
15 (v.) aliphatic or aromatic polyamine

and thereby scavenging hydrogen sulfide and/or mercaptan from the liquid or gaseous stream.

- 20 2. The process of Claim 1, wherein the 1,3,5-trisalkanylamino hexahydro-1,3,5-triazine derivative is of the formula:



wherein each A is independently selected from the formula $-(CHR^7)_x$ wherein x is from 1 to about 6 and each R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 is independently selected from $-H$ or a C_1 - C_6 alkyl.

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3. The process of Claim 2, wherein the 1,3,5-trisalkanylamino hexahydro-1,3,5-triazine derivative is 1,3,5-tris[3-(dimethylamino)propyl] hexahydro-1,3,5-triazine, 1,3,5-tris[2-(dimethylamino)ethyl] hexahydro-1,3,5-triazine, 1,3,5-tris[3-(diethylamino)propyl] hexahydro-1,3,5-triazine or 1,3,5-tris[2-(diethylamino)ethyl] hexahydro-1,3,5-triazine.

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4. The process of Claim 1, wherein the aminoalkyl group of the nitrogen heterocyclic compound is 2-aminoethyl or 2-hydroxyethyl.

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5. The process of Claim 1, wherein the nitrogen heterocyclic compound comprises morpholine bottoms.

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6. The process of Claim 1, wherein the amine oxide is of the formula $(R_1)(R_2)(R_3)N \rightarrow O$ wherein R_1 is an alkyl, alkenyl, alkylarylalkylene, alkenylarylalkylene, alkylaminoalkylene, alkenylaminoalkylene, alkylamidoalkylene, or alkenylamidoalkylene group, wherein each of said alkyl groups contains up to about 24 carbon atoms and may be branched or straight chained and saturated or unsaturated, and

wherein said alkylene groups have from about 1 to about 6 carbon atoms; and R₂ and R₃ are independently aliphatic chains having about 1 to about 30 carbon atoms;

7. The process of Claim 6, wherein the amine oxide is of the formula
- 5 R—CONHCH₂CH₂CH₂N⁺(CH₃)₂ O⁻ wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl.

8. The process of Claim 1, wherein the alkanolamine is a monoalkanolamine, dialkanolamine or trialkanolamine or a mixture thereof.

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9. The process of Claim 1, wherein the alkanolamine is selected from monoethanolamine, monomethanolamine, monopropanolamine, monobutanolamine, monopentanolamine, monohexanolamine, monoheptanolamine, monooctanolamine, monononanolamine, ethyldiethanolamine, dimethanolamine, methanolethanolamine,
- 15 diethanolamine, methanolpropanolamine, ethanolpropanolamine, dipropanolamine, methanolbutanolamine, ethanolbutanolamine, propanolbutanolamine, dibutanolamine, dipentanolamine, dihexanolamine, diheptanolamine dioctanolamine, triethanolamine and tripropanolamine.

- 20 10. The process of Claim 1, wherein the polyamine contains at least two amine groups per molecule.

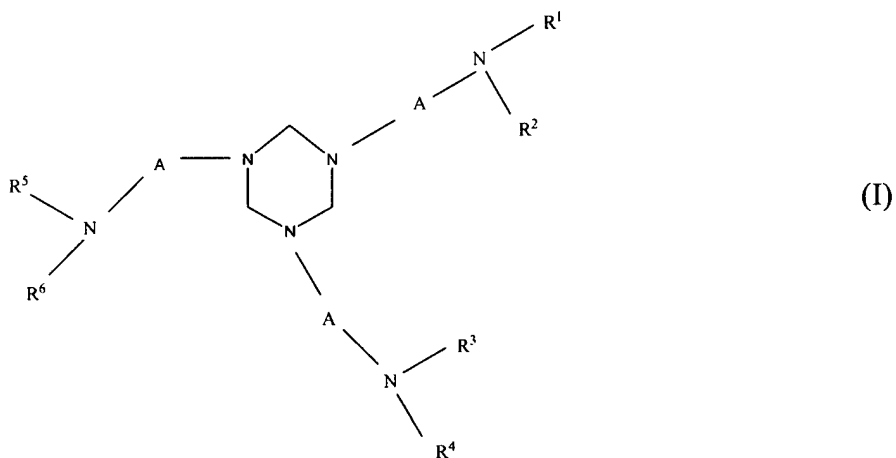
11. The process of Claim 10, wherein the polyamine is a polyalkylene or aromatic polyamine having from 1 to about 4 primary or secondary amine groups per
- 25 molecule of the formula —N(R₈)(R₉) wherein each R₈ and R₉ are independently selected from a —H or a C₁-C₆ alkyl, wherein each alkylene group contains between from 2 to about 8 carbon atoms.

12. The process of Claim 10, wherein the polyamine is dialkylene triamine,
- 30 trialkylene tetraamine or a pentaalkylene hexamine or a mixture thereof.

13. The process of Claim 10, wherein the polyamine is N, N'-di-sec-butyl-p-phenylenediamine, tris-(2-aminoethylamine), diethylene triamine, trimethylene tetraamine, pentaethylene hexamine, ethylenediamine, propylenediamine, triethylenetetramine, tetraethylenepentamine, tetrabutylene pentamine, 5 hexaethyleneheptamine, hexapentyleneheptamine, heptaethyleneoctamine, octaethylenenonamine, nonaethylenedecamine, decaethyleneundecamine, decahexyleneundecamine, undecaethylenedodecamine, dodecaethylenetridecamine, and tridecaethylenetetradecamine.

10 14. A process for scavenging hydrogen sulfide and/or mercaptan contaminants from a hydrocarbon stream, comprising mixing the hydrocarbon stream with a scavenging effective amount of a scavenger selected from a:

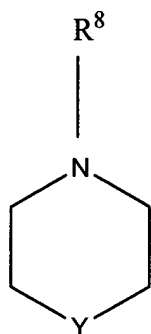
(i.) 1,3,5-trisalkanylamino hexahydro-1,3,5-triazine derivative of the formula:



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wherein each A is independently selected from the formula $-(CHR^7)_x$ wherein x is from 1 to about 6 and each R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 is independently selected from -H or a C_1 - C_6 alkyl;

(ii.) nitrogen heterocyclic compound of the formula:



(II)

wherein Y is -N or -O and R⁸ is an aminoalkyl group containing between 2 to 4 carbon atoms;

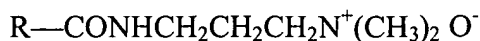
(iii.) amine oxide of the formula (R₁)(R₂)(R₃)N→O wherein R₁ is an alkyl, alkenyl, alkylarylalkylene, alkenylarylalkylene, alkylaminoalkylene, alkenylaminoalkylene, alkylamidoalkylene, or alkenylamidoalkylene group, wherein each of said alkyl groups contains up to about 24 carbon atoms and may be branched or straight chained and saturated or unsaturated, and wherein said alkylene groups have from about 1 to about 6 carbon atoms; and R₂ and R₃ are independently aliphatic chains having about 1 to about 30 carbon atoms;

(iv.) alkanolamine of the formula (R₄)(R₅)N(R₆)OH wherein R₆ is a C₁-C₁₂ linear or branched alkyl group, R₄ and R₅ are independently selected from hydrogen, R₆ or R₇-OH, and R₇ is methylene or a C₂-C₈ linear or branched alkylene group; or

(v.) aliphatic or aromatic polyamine
and thereby scavenging hydrogen sulfide and/or mercaptan contaminants from the hydrocarbon stream.

15. The process of Claim 14, wherein the 1,3,5-trisalkanylamino hexahydro-1,3,5-triazine derivative is 1,3,5-tris[3-(dimethylamino)propyl] hexahydro-1,3,5-triazine, 1,3,5-tris[2-(dimethylamino)ethyl] hexahydro-1,3,5-triazine, 1,3,5-tris[3-(diethylamino)propyl] hexahydro-1,3,5-triazine or 1,3,5-tris[2-(diethylamino)ethyl] hexahydro-1,3,5-triazine.

16. The process of Claim 14, wherein the amine oxide is of the formula:



wherein R is a radical selected from the group of decyl, cocoyl, lauryl, cetyl and oleyl.

17. The process of Claim 17, wherein the alkanolamine is selected from
 5 monoethanolamine, monomethanolamine, monopropylamine, monobutylamine,
 monopentylamine, monohexylamine, monoheptylamine, monooctylamine,
 monononylamine, ethyldiethanolamine, dimethanolamine, methanolethanolamine,
 diethanolamine, methanolpropylamine, ethanolpropylamine, dipropylamine,
 methanolbutylamine, ethanolbutylamine, propylbutylamine, dibutylamine,
 10 dipentylamine, dihexylamine, diheptylamine dioctylamine, triethanolamine and
 tripropylamine.

18. The process of Claim 14, wherein the polyamine contains at least two
 amine groups per molecule.

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19. The process of Claim 18, wherein the polyamine is a polyalkylene or
 aromatic polyamine having from 1 to about 4 primary or secondary amine groups per
 molecule.

20. The process of Claim 14, wherein the polyamine is N, N'-di-sec-butyl-p-
 phenylenediamine, tris-(2-aminoethylamine), diethylene triamine, trimethylene
 tetraamine, pentaethylene hexamine, ethylenediamine, propylenediamine,
 triethylenetetramine, tetraethylenepentamine, tetrabutylpentamine,
 hexaethyleneheptamine, hexapentyleneheptamine, heptaethyleneoctamine,
 25 octaethylenenonamine, nonaethylenedecamine, decaethyleneundecamine,
 decahexyleneundecamine, undecaethylenedodecamine, dodecaethylenetridecamine, and
 tridecaethylenetetradecamine.